

### **REMARKS**

Claims 1-30 are currently pending in the subject application and are presently under consideration. Claims 1, 12, 18-19, 24-25, 27-28 and 30 have been amended as shown on pg. 2-6 of the Reply. Applicants' representative thanks the Examiner for the courtesies extended during the telephonic interview on January 9, 2007, wherein the Examiner indicated that the amendments made herein appear to overcome the prior references cited by the Examiner.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

#### **I. Rejection of Claims 1, 2, 4, 10-16, and 24-30 Under 35 U.S.C. §103(a)**

Claim 1, 2, 4, 10-16, and 24-30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Reinhardt *et al.* (US 5,541,607) in view of Rosen (US 4,675,628). Withdrawal of this rejection is respectfully requested for at least the following reasons. Reinhardt *et al.* and Rosen, either alone or in combination, fail to teach or suggest each and every limitation set forth in the subject claims.

To reject claims in an application under §103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) ***must teach or suggest all the claim limitations***. See MPEP §706.02(j). The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) (emphasis added).

The subject claims relate to systems and methods that facilitate signal modulation, and in particular, to a PIN diode switch based delay line quadra-phase shift key (QPSK) modulator based on microwave monolithic integrated circuit (MMIC) technology. To this end, independent claim 1 as amended (and similarly amended independent claims 24 and 30) recites: *a monolithic*



*shift key (SK) modulation component, incorporating at least one positive-intrinsic-negative (PIN) diode, the PIN diode switch the signal through a plurality of phase shifting paths to introduce a plurality of phase shifts to the signal based on one of number or combination of the plurality of phase shifting paths.* Neither Reinhardt *et al.* nor Rosen teach or suggest this novel aspect of the claimed subject matter.

Rather, Reinhardt *et al.* discloses a system and method for polar digital beamforming where complex weighing signals can be generated by summing a sequence of complex multiplications or by simply inverting the real and imaginary components of the weighting signal for particular modulation schemes. (See Abstract). However, Reinhardt *et al.* does not teach or suggest PIN diodes, much less PIN diodes that switch signals through a plurality of phase shifting paths to introduce a plurality of phase shifts as recited in the subject independent claims.

The Examiner acknowledged the deficiencies of Reinhardt *et al.* and attempts to make up for the deficiencies of Reinhardt *et al.* with Rosen. (See Office Action dated November 7, 2006, pg. 2). Rosen discloses a monolithic chip phase shifter consisting of a PIN diode which is laterally elongated and shaped into a microstrip-like transmission line. Rosen notes that alternating-current (AC) signals can be coupled through the PIN diode transmission line where direct-voltage reverse bias, no bias or direct current forward bias are applied to select the appropriate value of equivalent shunt capacitance of the PIN diode transmission line to provide the desired phase shift of the AC signals passing therethrough. (See Abstract). Thus, the phase shift of the AC signals is a result of the change of electrical characteristics of the PIN diode transmission line. (See Rosen, col. 2, ll. 48-58). However, Rosen is silent with regard to *the PIN diode switch the signal through a plurality of phase shifting paths to introduce a plurality of phase shifts to the signal based on one of number or combination of the plurality of phase shifting paths* as recited in the subject independent claims as amended.

The subject claims recite a system or method that utilize PIN diodes as switches to form a switch based delay line quadra-phase shift key modulator. (See Specification, paragraph 10). Thus, PIN diodes can switch a signal through a plurality of phase shifting paths where phase shifts can be introduced into the signal. For example, the PIN diode can switch a signal between a short and a long length of transmission line to develop a phase associated with a transmission line propagation constant that is based on a differential transmission line length. (See Specification, paragraph 39). Rosen fails to teach or suggest such aspect as claimed.



In view of at least the foregoing, it is readily apparent that Reinhardt *et al.* and Rosen, alone or in combination, do not teach or suggest the subject invention as recited in amended independent claims 1, 24 and 30 (and claims 2, 4, 10-16, and 25-39 which depend therefrom). Accordingly, this rejection should be withdrawn.

**II. Rejection of Claims 3 and 6-9 Under 35 U.S.C. §103(a)**

Claims 3 and 6-9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Reinhardt *et al.* in view of Rosen and further in view of Dawson *et al.* (US 4,638,269) and Hopwood *et al.* (US 3,882,431). This rejection should be withdrawn for at least the following reason. Claims 3 and 6-9 depend from independent claim 1; Dawson *et al.* and Hopwood *et al.* do not overcome the aforementioned deficiencies of Reinhardt *et al.* and Rosen with respect to independent claim 1. Accordingly, claims 3 and 6-9 are allowable for at least the same reasons as independent claim 1. Hence, this rejection should be withdrawn.

**III. Rejection of Claim 17 Under 35 U.S.C. §103(a)**

Claim 17 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Reinhardt *et al.* in view of Rosen and further in view of Stiles, Jr. (US 3,768,050). It is respectfully submitted that this rejection should be withdrawn for at least the following reasons. Reinhardt *et al.*, Rosen and Stiles, Jr., individually or in combination, do not teach or suggest each and every element set forth in the subject claim. In particular, Stiles, Jr. does not make up for the aforementioned deficiencies of Reinhardt *et al.* and Rosen with respect to independent claim 1 (which claim 17 depends from). Therefore, the subject invention as recited in claim 17 is not obvious over the combination of Reinhardt *et al.*, Rosen and Stiles, Jr. Thus, it is respectfully submitted that this rejection be withdrawn.

**IV. Rejection of Claims 18-23 Under 35 U.S.C. §103(a)**

Claims 18-23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Reinhardt *et al.* in view of Rosen and further in view of Pozgay *et al.* (US 2004/0235426). It is respectfully submitted that this rejection should be withdrawn for at least the following reasons. Reinhardt *et al.*, Rosen and Pozgay *et al.*, individually or in combination, do not teach or suggest each and every element set forth in the subject claims.



The subject claims relate to transceiver systems that facilitate signal modulation, and in particular, to a PIN diode switch based delay line quadra-phase shift key (QPSK) modulator. To this end, independent claim 18 as amended recites ***a phase shifting component that phase shifts the signals via a low loss monolithic quadra-phase shift key (QPSK) modulator, the QPSK modulator utilizes at least one positive-intrinsic-negative (PIN) diode to introduce a plurality of phase shifts by switching the signals through a plurality of phase shifting paths.*** As discussed *supra*, neither Reinhardt *et al.* nor Rosen discloses, teaches, or suggests utilizing PIN diodes to switch signals through a plurality of phase shifting paths to introduce phase shifts to the signals as recited in the subject independent claim. Moreover, Pozgay *et al.* fails to make up for the aforementioned deficiencies of Reinhardt *et al.* and Rosen.

Pozgay *et al.* discloses a transceiver that has a transmit/receive switch to alternate between transmitting and receiving functions so that the entire T/R circuit can share low noise amplification (LNA) and power amplification (PA) such that both space and device count can be optimized. (See Pozgay *et al.*, paragraphs 4-6). However, nowhere in Pozgay *et al.* does it teach or suggest utilizing ***at least one PIN diode to introduce a plurality of phase shifts by switching the signals through a plurality of phase shifting paths*** as recited in the subject independent claim. Therefore, Pozgay *et al.* does not make up for the aforementioned deficiencies of Reinhardt *et al.* and Rosen.

In view of at least the foregoing, it is readily apparent that Reinhardt *et al.*, Rosen and Pozgay *et al.*, alone or in combination, do not teach or suggest the subject invention as recited in amended independent claims 18 (and claims 19-23 which depend therefrom). Accordingly, this rejection should be withdrawn.



**CONCLUSION**

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [TRWP122US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

AMIN, TUROC & CALVIN, LLP

/Himanshu S. Amin/

Himanshu S. Amin

Reg. No. 40,894

AMIN, TUROC & CALVIN, LLP  
24<sup>TH</sup> Floor, National City Center  
1900 E. 9<sup>TH</sup> Street  
Cleveland, Ohio 44114  
Telephone (216) 696-8730  
Facsimile (216) 696-8731